

Message Text

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SUBJ: TTBT/PNE NEGOTIATIONS - SUMMARY OF OCT 14 PLENARY

1. MEETING BEGAN AT 4:1P.M. STOESSEL DEGAN BY NOTING THAT SINCE WE BEGAN OUR DISCUSSIONS WE HAVE IDENTIFIED A NUMBER OF KEY ISSUES AND, BEFORE WE START OUR WORK THIS WEEK, HE BELIEVED IT WOULD BE BENEFICIAL TO REVIEW BRIEFLY AND CONCERNS AND INTRODUCED ROMNEY TO DISCUSS SOME OF THE SEISMIC ISSUES THAT ARE INVOLVED IN VERIFICATION OF PNES. STOESSEL NOTED THAT ROMNEY'S REMARKS WOULD BE CONFINED TO DISCUSSION OF PROBLEMS INVOLVED IN SEISMIC DETERMINATION OF YIELD OF PNES OUTSIDE THE POUNDARIES OF SPECIFIED WEAPONS TEST SITES.

2. FOLLOWING ROMNEY' PRESENTATION STOESSEL EMPHASIZED THAT THE MATERIAL ROMNEY HAD PRESENTED WAS CONFINED TO THE ISSUE OF SEISMIC DETERMINATION OF PNE YIELDS. HE NOTED THAT THE US SIDE WOULD UNDOUBTEDLY WISH TO RETURN TO OTHER ASPECTS OF SEISMIC VERIFICATION OF PNES IN THE FUTURE. HE STRESSED THAT SEISMIC MEANS ALONE ARE NOT SUFFICIENT FOR VERIFICATION OF YIELDS OF PNES AND CERTAINLY NOT THE PURPOSE OF THE EXPLOSIONS AND NOTED THAT WE NEED TO DEVELOP ALL ASPECTS OF PNE VERIFICATION IN ORDER TO ESTABLISH A SATISFACTORY PNE AGREEMENT.

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3. VERBATIM OF ROMNEY PRESENTATION FOLLOWS:

QUOTE. THIS AFTERNOON I WILL BEGIN THE DISCUSSION OF SOME OF THE CAPABILITIES AND LIMITATIONS OF SEISMIC VERIFICATION METHODS AS THEY APPLY TO NUCLEAR EXPLOSIONS FOR PEACEFUL PURPOSES. OUR DISCUSSIONS OF LAST SUMMER WERE DIRECTED CHIEFLY TOWARD THE APPLICATION OF SEISMOLOGY TO DETERMINING THE YIELD OF AN UNDERGROUND NUCLEAR EXPLOSION. IT SHOULD BE UNNECESSARY TO REPEAT THE DETAILS OF THOSE DISCUSSIONS, SINCE A COMMON UNDERSTANDING WAS ACHIEVED ON THE PRINCIPAL FACTORS GOVERNING THE ACCURACY WITH WHICH WE CAN ESTIMATE YIELD. BRIEFLY STATED, THE ACCURACY OF SEISMIC YIELD ESTIMATES DEPENDS UPON: FIRST, THE AMOUNT AND TYPE OF INFORMATION AVAILABLE TO US ON THE GEOPHYSICAL PARAMETERS OF THE ROCK AT AND NEAR THE EXPLOSION POINT; SECOND, OUR KNOWLEDGE OF THE DEPTH OF THE EXPLOSION; THIRD, OUR KNOWLEDGE OF THE ABSORPTION AND SCATTERING OF SEISMIC WAVES ALL ALONG THE PATHS BETWEEN THE EXPLOSION AND THE SEISMIC STATIONS; AND FOURTH, MEASUREMENT ERRORS AND SIMILAR FACTORS WHICH ARE USUALLY LESS IMPORTANT.

THE ESSENTIAL CONCLUSIONS OF OUR PREVIOUS DISCUSSIONS ON SEISMIC YIELD ESTIMATES FOR NUCLEAR EXPLOSIONS AT SPECIFIED TEST SITES ARE EMBODIED IN THE PROTOCOL OF THE THRESHOLD TEST BAN TREATY OF 3 JULY 1974. THAT PROTOCOL OUTLINES VARIOUS KINDS OF INFORMATION WHICH MUST BE MADE AVAILABLE TO MAKE REASONABLY ACCURATE ESTIMATES OF YIELD FROM DISTANT SEISMIC MEASUREMENTS. ALTHOUGH THE TREATY AND PROTOCOL EXPLICITLY EXCLUDE PNES FROM THEIR PROVISIONS, SOME OF THE DATA REQUIREMENTS FOR PNES MAY BE OF THE SAME KIND, AND THERE MAY BE REQUIREMENTS FOR OTHER KINDS OF INFORMATION AS WELL.

IT SEEMS TO US THAT SEISMIC DETERMINATION OF YIELD FOR PNES WILL USUALLY BE MORE DIFFICULT THAN FOR EXPLOSIONS AT THE NUCLEAR TEST SITES. THIS IS A CONSEQUENCE OF SEVERAL FACTORS UNIQUE TO PNES. FOR EXAMPLE, CERTAIN PNE APPLICATIONS MAY REQUIRE

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ONLY A SINGLE EXPLOSION, WHICH MEANS THAT WE SHALL NOT HAVE THE ADVANTAGE OF TWO CALIBRATION EXPLOSIONS AS WILL BE THE CASE ON WEAPON TEST SITES. FURTHERMORE, MANY OF THE LIKELY PNE LOCALITIES WILL INVOLVE COMPLEX GEOLOGICAL FORMATIONS, WHICH MAY IMPLY THAT THE GEOPHYSICAL PARAMETERS THAT GOVERN SEISMIC COUPLING WILL BE HIGHLY VARIABLE AND THEREFORE DIFFICULT TO INTERPRET. AMBASSADOR STOESSEL REFERRED TO THESE

PROBLEMS LAST FRIDAY. BEYOND THESE FACTORS, WE ALSO NOTE THAT CERTAIN PNE APPLICATIONS WILL REQUIRE EXPLOSIONS AT SUCH SHALLOW DEPTHS THAT THE SEISMIC COUPLING WILL BE SENSITIVELY DEPENDENT UPON THE EXACT DEPTH OF BURIAL. THIS IS A HIGHLY NON-LINEAR RELATIONSHIP FOR THE CALCULATIONS ARE UNCERTAIN AND EXPERIMENTAL DATA ARE DEFICIENT. FINALLY, CERTAIN PNE APPLICATIONS MAY REQUIRE ARRAYS OF EXPLOSIVE CHARGES FIRED AT NEARLY THE SAME TIME, WHICH COULD PREVENT SEISMIC DETERMINATION OF THE YIELDS OF INDIVIDUAL EXPLOSIONS, OR COULD EVEN PREVENT DETERMINATION OF THE TOTAL YIELD IF EITHER THE ARRAY LENGTH OR THE TIME INTERVALS ARE SUCH THAT DESTRUCTIVE INTERFERENCE OCCURS IN THE SEISMIC WAVES. THESE COMPLICATING FACTORS MEAN THAT THE NEEDS FOR HIGH QUALITY SEISMIC DATA AND OTHER KINDS OF INFORMATION ARE GREATER FOR PNES THAN FOR NUCLEAR EXPLOSIONS ON TEST SITES.

HOW CAN THE DATA NEEDED FOR SEISMIC VERIFICATION OF YIELD BE OBTAINED? AT THE YIELD LEVELS OF INTEREST, ADEQUATE SEISMIC MEASUREMENTS CAN BE OBTAINED BY NATIONAL MEANS, AS YOU STATED LAST FRIDAY, MR. MINISTER. THE DATA ON GEOLOGICAL AND GEOPHYSICAL PARAMETERS AT AND NEAR THE SHOT POINT, HOWEVER, WOULD NECESSARILY HAVE TO BE OBTAINED THROUGH APPROPRIATE DATA EXCHANGE PROCEDURES. INFORMATION ON DEPTH OF THE EXPLOSION WOULD ALSO HAVE TO BE MADE AVAILABLE UNDER APPROPRIATE PROCEDURES, SINCE SOME PNE APPLICATIONS REQUIRE EXPLOSIONS AT SUCH SHALLOW DEPTH THAT EVEN THE MOST ENTHUSIASTIC SEISMOLOGIST WOULD NOT CLAIM THE ABILITY TO DISCERN DEPTH AT ALL, MUCH LESS

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DETERMINE IT WITH USEFUL ACCURACY. NUMEROUS OTHER FACTORS THAT MAY AFFECT SEISMIC AMPLITUDES, AND HENCE YIELD ESTIMATES, SUCH AS NUMBERS AND LOCATIONS OF MULTIPLE EXPLOSIVES, THEIR YIELDS, AND THEIR FIRING ORDER AND TIMING WOULD OBVIOUSLY NEED TO BE PART OF THE DATA TO BE EXCHANGED.

THE COMBINATION OF ALL OF THESE KINDS OF INFORMATION WILL BE NECESSARY FOR SEISMIC ESTIMATES OF YIELD OF PNES, WHICH IS ONE OF THE IMPORTANT FACTORS INVOLVED IN VERIFICATION OF COMPLIANCE WITH ANY PNE AGREEMENT. WE SHOULD, OF COURSE, ACKNOWLEDGE THAT SEISMIC MEANS ALONE CANNOT DETERMINE THE CHARACTER OF THE EXPLOSIVE ITSELF, NOR CAN IT SHOW

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THAT WEAPONS-RELATED DATA WERE NOT OBTAINED. END QUOTE.

4. SAFRONOV ASKED IF AN EXPLOSION GREATER THAN 150 KILOTONS AT SHALLOW DEPTHS COULD BE DETECTED SEISMICALLY. (THE SOVIET INTERPRETER DID NOT TRANSLATE THE ADDITIONAL PHRASE, QUOTE OR BY RADIOACTIVITY UNQUOTE). ROMNEY REPLIED YES.

5. MYASNIKOV ASKED IF EXACT ANALYTICAL METHODS WERE AVAILABLE TO RELATE THE SEISMIC EFFECTS TO THE DEPTH OF BURIAL. ROMNEY REPLIED ONLY APPROXIMATELY FOR CERTAIN MATERIALS.

6. MOROKHOV SAID THEY WOULD STUDY ROMNEY'S REMARKS CAREFULLY. HE HOPED EXPERIENCE OF PREVIOUS TALKS WOULD HELP. THE CHARACTER OF PNE SHOULD BE TAKEN INTO CONSIDERATION. MR. SAFRONOV WOULD COMMENT ON THESE MATTERS AT ANOTHER MEETING.

7. HE NOTED THAT THE SOVIET UNION HAD AN EXTENSIVE PROGRAM OF PNE APPLICATION. ONE OF THESE WAS TO CREATE UNDERGROUND CAVITIES TO STORE GAS CONDESATES. SOME OF THIS HAD BEEN PREVIOUSLY REPORTED. DR. MYASNIKOV WOULD REPORT ON THIS PROGRAM.

8. DR. MYASNIKOV THEN PROCEEDED TO GIVE AN EXTENSIVE
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AND DETAILED TECHNICAL REPORT ON THE PROCEDURES AND RESULTS OF A PARTICULAR EXPERIMENT, IN WHICH A CAVITY WAS PRODUCED, TESTED, AND PUT IN OPERATION FOR THE STORAGE OF GAS CONDENSATES. THIS WAS FAR TOO TECHNICAL FOR A VERBATIM. A RECONSTRUCTION OF THE TECHNICAL CONTENT WILL BE PREPARED.

9. NEXT MEETING IS AT 4:00P.M., TUESDAY. SAFRONOV WILL SPEAK ON SEISMIC ISSUES FOR THE SOVIETS AND FLEMING WILL REVIEW THE US PNE PROGRAM.
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